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Steven R. Walther

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EXAMINER

CROWELL, ANNA M

ART UNIT

PAPER NUMBER

1763

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DELIVERY MODE

06/04/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/006,462	Applicant(s) WALTHER, STEVEN R.	
	Examiner Michelle Crowell	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 6-9, 15-25 and 28-39 is/are pending in the application.
- 4a) Of the above claim(s) 6-9, 15-17 and 28-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-25 and 34-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

Claims 6-9, 15-25, and 27-39 are pending in the application. Claims 6-9, 15-17, and 28-33 are withdrawn from consideration. Claims 18-25 and 27-39 are rejected.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 18 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Goeckner et al. (U.S. 6,182,604) and Suzuki et al. (U.S. 5,433,787)

Referring to Figure 1 and column 4, line 32-column 5, line 33, Liebert et al. discloses a plasma doping apparatus comprising: a plasma doping chamber 10; a platen 14 located in the plasma doping chamber for supporting a workpiece 20 (col. 4, lines 32-36); an anode 24 spaced apart from the platen in the plasma doping chamber (col.4, lines 44-46); a process gas source 36 coupled to the plasma doping chamber, wherein a plasma containing ion of the process gas is produced in a plasma discharge region between the anode and the platen (col.5, lines 4-8); a pulse source 30 for applying pulses between the platen and the anode for accelerating ions from the plasma into the workpiece (col.4, lines 50-57, col.5, lines 22-33).

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Liebert et al. fail to teach a hollow electrode surrounding the plasma discharge region disposed within the plasma doping chamber.

Referring to Figure 2a-b and column 5, line 26-column 6, line 6, Goeckner et al. teaches a plasma doping apparatus which uses a hollow electrode 300 surrounding the plasma discharge region disposed within the plasma doping chamber in order to produce a more uniform plasma at a lower gas pressure. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Liebert et al. in view of Setoyama et al. with a hollow electrode surrounding the plasma discharge region disposed within the plasma doping chamber as taught by Goeckner et al. in order to produce a more uniform plasma at a lower gas pressure.

Liebert et al. in view of Goeckner et al. fail to teach a first plurality of elongated magnetic elements affixed within the hollow electrode.

Referring to column 8, lines 38-43, Suzuki et al. teaches a plasma processing apparatus wherein a first plurality of magnet elements 13 are affixed within the hollow electrode. It is conventionally known in the art to affix magnets with an electrode in order to enhance uniform plasma consistency. Additionally, regarding the shape of the elongated magnets, it should be noted that the shape of the claimed elongated magnet was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elongated magnet was significant. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the hollow electrode of Liebert et al. in view of Goeckner et al. with a first plurality of elongated magnetic

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elements affixed within the hollow electrode as taught by Suzuki et al. since this would enhance uniform plasma consistency.

With respect to claim 23, the plasma doping apparatus of Liebert et al. in view of Goeckner et al., Sato, and Suzuki et al. further includes that the first plurality of elongated magnetic elements are configured to increase the plasma density in an outer portion of the plasma discharge region (par.[0009] of Sato).

With respect to claim 24, the plasma doping apparatus of Liebert et al. in view of Goeckner et al., Sato, and Suzuki et al. further includes first plurality of elongated magnetic elements 10a, 10b are arranged in a cylindrical array around the plasma discharge region (Drawing 2 of Sato).

3. Claims 19-20, 22, 25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Goeckner et al. (U.S. 6,182,604) and Suzuki et al. (U.S. 5,433,787) as applied to claims 18 and 23-24 above, and further in view of and Setoyama et al. (U.S. 6,196,155).

The teachings of Liebert et al. in view of Goeckner et al. and Suzuki et al. have been discussed above.

Liebert et al. in view of Goeckner et al. and Suzuki et al. fail to teach a second plurality of magnetic elements disposed near or on the anode.

Referring to Figure 1 and column 4, line 52-column 6, line 49, Setoyama et al. teaches a plasma processing apparatus having a plurality of magnetic elements 20a disposed around the plasma discharge region for efficiently confining the plasma for processing and easily

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maintaining the plasma density (col.6, lines 1-4). Additionally, the magnetic elements 20a are disposed on or near the anode 9. Furthermore, the magnetic elements are arranged in one or more annular rings (col. 5, lines 1-2). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Liebert et al. in view of Goeckner et al. and Suzuki et al. with the second plurality of magnetic elements disposed near or on the anode as taught by Setoyama et al. in order to efficiently confine the plasma for processing and to easily maintain the plasma density.

Liebert et al. in view of Goeckner et al. and Suzuki et al. fail to teach the first plurality of magnetic elements have alternating polarities.

Referring to Figure 1 and column 4, line 52-column 6, line 49, Setoyama et al. teaches a plasma processing apparatus having magnetic elements 20b with alternating polarities facing the plasma discharge region (col. 5, lines 1-6) in order to increase the processing rate (col. 6, lines 18-21). In addition, the magnetic elements produce cusp magnetic fields 30 in a region surrounding the plasma discharge region (see Fig. 1). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first plurality of magnetic elements of Liebert et al. in view of Goeckner et al. and Suzuki et al. with alternating polarities as taught by Setoyama et al. in order to increase the processing rate.

4. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Goeckner et al. (U.S. 6,182,604), Suzuki et al., (U.S. 5,433,787), and Setoyama et al. (U.S. 6,196,155) as applied to claims 19-20, 22, 25, and 27 above, and further in view of Shan et al. (U.S. 6,022,446).

The teachings of Liebert et al. in view of Goeckner et al., Suzuki et al., and

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Setoyama et al. have been discussed above.

Liebert et al. in view of Goeckner et al., Suzuki et al., and Setoyama et al. fail to teach magnetic elements which are radially aligned to form a spoke configuration.

Referring to Figure 4a and column 8, lines 23-49, Shan et al. teaches a plasma processing apparatus wherein the magnetic elements 90 are radially aligned to form a spoke configuration. With this spoke configuration, a radially symmetrical magnetic field is generated to enhance processing rates. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the magnetic elements of Liebert et al. in view of Goeckner et al., Suzuki et al., and Setoyama et al. in a spoke configuration as taught by Shan et al. since a radially symmetrical magnetic field is generated to enhance processing rates.

5. Claims 34-36 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Hirata (Japanese Patent Publication 57-023227) and Setoyama et al. (U.S. 6,196,155).

Referring to Figure 1 and column 4, line 32-column 5, line 33, Liebert et al. discloses a plasma doping apparatus comprising: a plasma doping chamber 10; a platen 14 located in the plasma doping chamber for supporting a workpiece 20 (col. 4, lines 32-36); an anode 24 spaced apart from the platen in the plasma doping chamber (col.4, lines 44-46); a process gas source 36 coupled to the plasma doping chamber, wherein a plasma containing ion of the process gas is produced in a plasma discharge region between the anode and the platen (col.5, lines 4-8); a pulse source 30 for applying pulses between the platen and the anode for accelerating ions from the plasma into the workpiece (col.4, lines 50-57, col.5, lines 22-33).

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Liebert et al. fail to teach an adjustable anode configured to be movable within the plasma chamber and a first plurality of magnetic elements disposed on the adjustable electrode.

Referring to Drawings 3, 4, 5, and 10 and the abstract, Hirata teaches a plasma processing apparatus wherein an adjustable anode 9, 10, 11 is configured to be vertically movable 15, 16, 17 within the plasma chamber in order to obtain an uniform processing rate. Additionally, Setoyama teaches a plasma processing apparatus wherein a first plurality of magnetic elements 20a (arranged in one or more annular rings (col. 5, lines 1-2)) are disposed on the anode 9 and the anode 9 and magnets 20a are vertically movable in order to change the processing rate (col. 6, lines 22-49). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the anode of Liebert et al. to be movable and have a first plurality of magnets disposed on as taught by Hirata and Setoyama et al. in order to achieve an uniform processing rate or change the processing rate.

Liebert et al. fail to teach the first plurality of magnetic elements have alternating polarities.

Referring to Figure 1 and column 4, line 52-column 6, line 49, Setoyama et al. teaches a plasma processing apparatus having magnetic elements 20b with alternating polarities facing the plasma discharge region (col. 5, lines 1-6) in order to increase the processing rate (col. 6, lines 18-21). In addition, the magnetic elements produce cusp magnetic fields 30 in a region surrounding the plasma discharge region (see Fig. 1). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the first plurality of magnetic elements of Liebert et al. with alternating polarities taught by Setoyama et al. in order to increase the processing rate.

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6. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Hirata (Japanese Patent Publication 57-023227) and Setoyama et al. (U.S. 6,196,155) as applied to claims 34-36 and 38 above, and further in view of Shan et al. (U.S. 6,022,446).

The teachings of Liebert et al. in view of Hirata and Setoyama et al. have been discussed above.

Liebert et al. in view of Hirata and Setoyama et al. fail to teach magnetic elements which are radially aligned to form a spoke configuration.

Referring to Figure 4a and column 8, lines 23-49, Shan et al. teaches a plasma processing apparatus wherein the magnetic elements 90 are radially aligned to form a spoke configuration. With this spoke configuration, a radially symmetrical magnetic field is generated to enhance processing rates. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the magnetic elements of Liebert et al. in view of Hirata and Setoyama et al. in a spoke configuration as taught by Shan et al. since a radially symmetrical magnetic field is generated to enhance processing rates.

7. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liebert et al. (U.S. 6,020,592) in view of Hirata (Japanese Patent Publication 57-023227) and Setoyama et al. (U.S. 6,196,155) as applied to claims 34-36 and 38 above, and further in view of Goeckner et al. (U.S. 6,182,604), and Suzuki et al. (U.S. 5,433,787) The teachings of

Liebert et al. in view of Hirata and Setoyama et al. have been discussed above.

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Liebert et al. in view of Hirata and Setoyama et al. fail to teach a hollow electrode surrounding the plasma discharge region.

Referring to Figure 2a-b and column 5, line 26-column 6, line 6, Goeckner et al. teaches a plasma doping apparatus which uses a hollow electrode 300 surrounding the plasma discharge region in order to produce a more uniform plasma at a lower gas pressure. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the apparatus of Liebert et al. in view of Hirata and Setoyama et al. with a hollow electrode surrounding the plasma discharge region as taught by Goeckner et al. in order to produce a more uniform plasma at a lower gas pressure.

Liebert et al. in view of Hirata, Setoyama et al., and Goeckner et al. fail to teach a second plurality of elongated magnetic elements affixed within the hollow electrode.

Referring to column 8, lines 38-43, Suzuki et al. teaches a plasma processing apparatus wherein a first plurality of magnet elements 13 are affixed within the hollow electrode. It is conventionally known in the art to affix magnets with an electrode in order to enhance uniform plasma consistency. Additionally, regarding the shape of the elongated magnets, it should be noted that the shape of the claimed elongated magnet was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed elongated magnet was significant. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the hollow electrode of Liebert et al. in view of Hirata, Setoyama et al., and Goeckner et al. with a second plurality of elongated magnetic elements affixed within the hollow electrode as taught by Suzuki et al. since this would enhance uniform plasma consistency.

Response to Arguments

8. Applicant's arguments filed March 12, 2007 have been fully considered but they are not persuasive.

Applicant has argued that the magnets of Sato are affixed on magnetic holders rather than within a hollow electrode disposed within the chamber; however, this argument is moot since the Sato reference has been dropped from the final rejection.

Applicant has argued that Suzuki et al. teaches that magnets elements are affixed within the hollow electrode; however, the hollow electrode fails to surround the plasma discharge region disposed within the plasma doping chamber. Yet, it should be noted that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, Goeckner et al. teaches that it is conventionally known in the art for a hollow electrode to surround the plasma discharge region disposed within the plasma doping chamber (col. 5, lines 26-38, col. 7, lines 27-29). Suzuki et al. was simply applied for teaching of magnet elements affixed within the hollow electrode. Therefore, the combination teaches a hollow electrode that surrounds the plasma discharge region disposed within the plasma doping chamber wherein magnet elements are affixed with the hollow electrode. Thus, the combination of Liebert et al. in view of Goeckner et al. and Suzuki et al. satisfy the claimed requirements.

Applicant has argued that the magnets of Setoyama are external to the chamber and are not movable within the plasma doping chamber. As stated above, one cannot show nonobviousness by attacking references individually where the rejections are based on

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combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, Hirata teaches a movable anode located within a chamber. Setoyama was simply applied to show that magnet elements can be disposed on an anode. Thus, the combination teaches that magnet elements can be disposed on a movable anode within a chamber and hence satisfies the claimed requirements.

Applicant has argued that the roof plate 9 of Setoyama is not an anode as required by Applicant; however, the roof plate 9 is connected to power source 11 and thus acts an anode (col. 4, lines 59-62).

Applicant has argued that the magnets of Setoyama fail to be disposed on an adjustable anode. As stated above, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In the instant case, Hirata teaches an adjustable anode. Setoyama was simply applied to show that magnet elements can be disposed on an anode. Thus, the combination teaches that magnet elements can be disposed on an adjustable anode and hence satisfies the claimed requirements.

Applicant has argued that the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate; however, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what

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the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In the instant case, Setoyama (secondary reference) teaches that it is conventionally known in the art of plasma chambers to apply a magnet element in combination with an anode region in order to efficiently confine the plasma for processing and easily maintain the plasma density. Therefore, the combination teaches that magnet elements (not necessarily the same magnetic structure as Setoyama) can be disposed on an adjustable anode and hence satisfies the claimed requirements.

Additionally, it should be noted that claim 34 is not supported in one embodiment (or Figure) and hence Applicant claims a configuration that is not supported by the specification. As seen in Figures 5-6, when the when magnet elements are disposed on the anode 150, 190, neither the magnets nor the anode are movable (Applicant's specification, page 8, line 11-page 9, line 32). Furthermore, as seen in Figure 2, when the anode 180, 182, 184 is adjustable, the magnet elements are not disposed on the anode (Applicant's specification, page 10, lines 24-32).

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Crowell whose telephone number is (571) 272-1432. The examiner can normally be reached on M-F (9:30 -6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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